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(54) **Multilayer hard films for longitudinal biasing in magnetoresistive transducer**

(57) A magnetoresistive transducer (46;114) includes a magnetoresistive layer (74; 120) having end portions (74A,74B;120A,120B) spaced by a central active portion (74C;120C). The longitudinal bias for the magnetoresistive layer (74;120) is cooperatively furnished by a pair of hard magnetic bias regions (78,80;124,126). Each of the two hard magnetic bias regions (78,80;124,126) includes a plurality of magnetized layers and each bias region is disposed in contact with one of the end portions (74A,74B;120A, 120B) of the magnetoresistive transducer (46;114). The magnetic flux required for the magnetoresistive layer (74;120) to maintain a single domain state is adequately provided by the hard magnetic bias regions (78,80;124,126). In one embodiment, a substantially uniform thickness for the

entire transducer (46;114) is achieved, allowing the longitudinal bias to be continuously supplied to the magnetoresistive layer (74;120). In another embodiment, thinner hard magnetic bias regions (78,80;124,126) provide improved step coverage for the overlying magnetic shield layer (54).

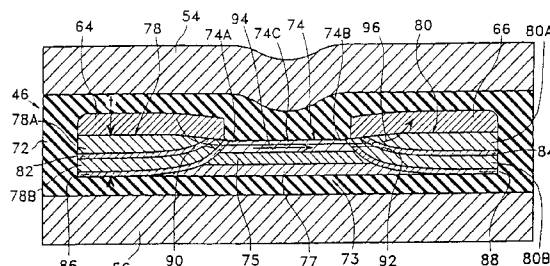


Fig. 6

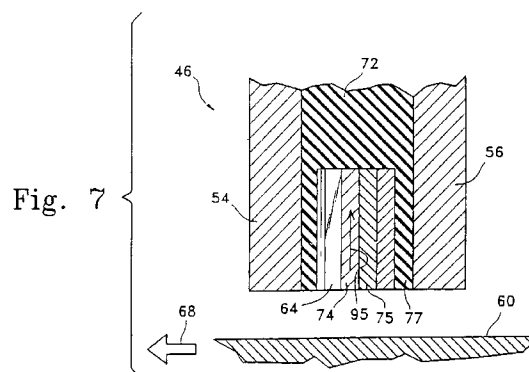


Fig. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 95 11 4955

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	US-A-5 325 253 (CHEN MAO-MIN ET AL) 28 June 1994 * figures 3-5 * * column 2, line 45 - line 53 * * column 4, line 1 - line 26 * * claim 7 * ---	1-3,9,13	G11B5/39
Y	EP-A-0 612 061 (IBM) 24 August 1994 * column 4, line 35 - column 6, line 8 * * figures 2,3 * ---	1-9, 11-19	
Y,D	EP-A-0 422 806 (IBM) 17 April 1991 * column 3, line 46 - line 53 * * figures 3-5 * ---	1-9, 11-19	
A	EP-A-0 216 062 (IBM) 1 April 1987 * column 5, line 5 - column 6, line 31 * * claims 1,12; figures 4,6 * ---	1,2,4	
A	EP-A-0 490 608 (IBM) 17 June 1992 * column 3, line 55 - column 5, line 15 * * claims 1,9,11; figure 5 * ---	1-3,6-9, 11-15, 17-19	TECHNICAL FIELDS SEARCHED (Int.Cl.6) G11B G01R
A	US-A-5 287 238 (BAUMGART PETER M ET AL) 15 February 1994 * figure 10 * * column 8, line 30 - column 9, line 49 * ---	1-3,5-19	
A	US-A-4 447 839 (DESSERRE JACQUES ET AL) 8 May 1984 * figures 7,8 * * column 10, line 31 - column 11, line 63 * * --- -/-	1,2,4, 10,13, 14,16	
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 31 May 1996	Examiner Schiwy-Rausch, G
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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Application Number
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DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
A	US-A-5 313 186 (SCHUHL ALAIN ET AL) 17 May 1994		

X,P	EP-A-0 634 740 (IBM) 18 January 1995 * column 5, line 53 - column 6, line 32 * * column 7, line 48 - column 8, line 7 * * column 8, line 21 - column 9, line 46 * * figures 3,6,7 * -----	1-3,5-19	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
The present search report has been drawn up for all claims			
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